

Electromagnetic Fields and Health Outcomes[†]

B Knave,^{*MD, PhD}

Abstract

Over the past two decades, there has been increasing interest in the biological effects and possible health outcomes of weak, low-frequency electric and magnetic fields. Epidemiological studies on magnetic fields and cancer, reproduction and neurobehavioural reactions have been presented. More recently, neurological, degenerative and heart diseases have also been reported to be related to such electromagnetic fields. Furthermore, the increased use of mobile phones worldwide has focussed interest on the possible effects of radiofrequency fields of higher frequencies. In this paper, a summary is given on electromagnetic fields and health outcomes and what policy is appropriate—“no restriction to exposure”, “prudent avoidance” or “expensive interventions”?

The results of research studies have not been unambiguous; studies indicating these fields as being a health hazard have been published and so were studies indicating no risk at all. In “positive” studies, different types of effects have been reported despite the use of the same study design, e.g., in epidemiological cancer studies. There are uncertainties as to exposure characteristics, e.g., magnetic field frequency and exposure intermittence, and not much is known about possible confounding or effect-modifying factors. The few animal cancer studies reported have not given much help in risk assessment; and in spite of a large number of experimental cell studies, no plausible and understandable mechanisms have been presented by which a carcinogenic effect could be explained.

Exposure to electromagnetic fields occurs everywhere: in the home, at work, in school, etc. Wherever there are electric wires, electric motors and electronic equipment, electromagnetic fields are created. This is one of the reasons why exposure assessment is difficult. For epidemiologists, the problem is not on the effect side as registers of diseases exist in many countries today. The problem is that epidemiologists do not know the relevant exposure characteristics to be used in their studies.

In international guidelines, limits for restrictions of field exposure are several orders of magnitude above what can be measured from overhead power lines and found in “electrical” occupations. These guidelines emphasize that the state of scientific knowledge today does not warrant limiting exposure levels for the public and the work force, and that further data are required to confirm whether health hazards are present. In some countries, however, the “principle of caution” or “prudent avoidance” has been adopted; meaning the low-cost avoidance of unnecessary exposure as long as there is scientific uncertainty about its health effects.

Ann Acad Med Singapore 2001; 30:489-93

Key words: *Mobile phones, Occupational exposures, Over-head power lines*

* Professor

National Institute for Working Life, Stockholm, Sweden

Address for Reprints: Professor Bengt Knave, National Institute for Working Life, S-11279 Stockholm, Sweden.

[†] This keynote address was delivered at the 26th International Congress on Occupational Health, 26 August to 1 September 2000, Singapore